REMARKS BY GEORGIA TECH PRESIDENT G. WAYNE CLOUGH
"The Role of the Technological University in National, Regional Policy"
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I am honored and pleased to join you for lunch today and have this opportunity to think with you about the contribution that a technological university can make to policy discussions and decisions.

Scientists and engineers have always made the discoveries and created the technology that has enabled humans to prosper. But for much of history we have remained focused on the work in our labs, and have not pay much attention to the social ramifications and implications of our technology. In many cases, we created technology simply because we could, without focusing on what problem we could make it solve or what purpose we could make it serve so that it would make life better for individual people, their communities, and society at large.

However, as technology has become increasingly ubiquitous in every aspect of our lives and our world, technological decisions we used to regard as unrelated to social, political, and economic concerns have in fact become tightly interwoven with them. Technology and social change have become a double helix – two strands that are inextricably interlaced. We can no longer create technology in a vacuum and put it on the shelf. We must view our work in a much larger social context and understand the larger, human dimensions and implications of what we are doing.

When former Senator Sam Nunn met with the first group of MacArthur Fellows at Georgia Tech, he told them, "Bridges must be built between the world of science and the world of human relations. Bridges can give shape and purpose to our science, can breathe heart and soul into our new technologies. Together scientists and policy makers must help our citizens reap the benefits of our exploding scientific knowledge, and together we must protect this generation and future generations from the dark side of this explosion."

Many of the most intractable problems facing the world need technological expertise if they are to be solved. For example, one of the most pressing problems that will come to the fore in the next decade or two is fresh water. By the year 2020, virtually every nation in the world will have fresh water supply problems. Another is energy. The world is steadily increasing its demand for more energy, yet the hazards of global warming are becoming more and more apparent. Global conferences like Rio and Kyoto demonstrate the difficulty of finding political solutions to problems like these. Political solutions invariably call for someone to give us something, and nobody wants to volunteer.

However, scientists and engineers can step into the breach created by political standoffs and offer solutions based on environmentally sustainable technology. For example, the developing world offers a unique opportunity to bring new energy technology to the fore quickly and test new approaches like hydrogen fuel cells, which have the added advantage of generating water as a by product.

We celebrated the fall of the Berlin Wall and the dissolution of the Soviet Union because they opened the door of economic opportunity. Unfortunately, as our good friend Senator Sam Nunn foresaw so well, the disappearance of the old, rigid world order also opened the door for terrorism. This is another challenge that calls for scientists and engineers to provide new tools and new technology for homeland security.

The future value of science and engineering will be measured not simply by what we discover or invent, but by how indispensable we are in solving these sorts of problems that society is facing. But in addition to creating the technology that helps to solve problems, society also needs the input of scientists and engineers in the public policy arena. Technology has literally exploded all around us, running out ahead of the ability of most citizens to understand it. Even those with college degrees who use advanced technology often do not understand how it works, cannot envision its potential, and do not understand the possibilities for misuse and abuse.

Government policy makers are increasingly called upon to regulate technology in industries like telecommunications. They are called upon to set policy on matters that involve technology, such as energy or biotechnology. And citizens want legal protection from abuses of technology such as Internet fraud and information theft from computer databases.

Society increasingly needs the expertise and leadership of scientists and engineers if it is to make wise decisions about technology. And we have the skills and knowledge to provide that leadership and expertise. Engineers, for example, work with and understand complex systems. They figure out efficient worldwide delivery systems for companies like FedEx and UPS. They design airplanes with tens of thousands of uniquely engineered parts that must fit together and work together with 100 percent reliability. They develop manufacturing systems in which the raw materials arrive just in time and the finished product ships just in time. They create powerful computers to model systems that are difficult or impossible to experiment with in the lab, from crash-testing cars to simulating nuclear explosions.

This ability to see the big picture and make a large number of components mesh together and work together to produce a desired outcome is very much in demand in the policy arena. Public policy decisions often involve large and complex systems. Think about Medicare or Medicaid, for example. Think about tax policy or telecommunications systems or the federal aviation system that governs airports and airlines. Policy makers are repeatedly called upon to tinker with these massive systems in order to produce a desired result, only to discover that the unintended and unexpected consequences of their tinkering have outweighed the benefits.

I have had the privilege to participate in policy discussions at all three levels – local, state, and national. These opportunities were learning experiences that demonstrated why scientists and engineers must become more engaged with public policy. So let me tell you a little about them and the lessons they illustrate.

At the local level, the City of Atlanta is under court order to fix major problems with its water and sewer system resulting from decades of neglect. In June of 2002, Mayor Shirley Franklin asked me to chair a panel of experts to advise her on the city's $1 billion plan to deal with its combined sewer overflow problems and prevent sewer overflows into the Chattahoochee River.

The first thing I realized was the truth of the saying, "All politics is local." So many political issues are either grassroots based to begin with, or, even when they are larger in scope, they take form in people's lives in a distinctly grassroots expression. And when you have an issue that touches individual citizens in their personal lives, they can become very passionate about it. In the case of Atlanta's sewer system, many of the arguments were not only highly emotional, but they were also uninformed. And we could see the real potential for emotion to override knowledge and reason in the decision-making process.

So the mayor wisely decided she needed outside expertise, and she asked me to help put together a panel of independent national experts, which I chaired. These experts worked for free, and they had no vested political or business interests with the city, so the expertise they offered was untainted by their own interests or the interests of anyone else.

The panel carefully listened to the community concerns and to presentations of all the options, including those that were unrealistic and impractical but had their local champions. This process by the panel enabled the concerns of citizens to be heard, but they were heard in an orderly fashion, and the process of sorting out the options was put onto unbiased, rational ground. In the end, the experts proposed a plan that met the environmental considerations, could be completed by the court's deadline, was the least expensive approach, and minimized the disruption from construction. In other words, it addressed the concerns that lay at the heart of much of the emotion that swirled around the issue. In the process of putting the decision making on a rational course, the panel of experts was also able to help diffuse the highly emotional but uninformed arguments.

Another important lesson in that process was to pay attention to the composition of the panel. In addition to balancing the areas of expertise among the panel members, we also included a few experts from within the state of Georgia who had worked on similar problems in other Georgia cities. And that helped to reinforce the panel's credibility with the local community.

At the state level, I have chaired two special task forces, one on the de-regulation of natural gas and the other on a coordinated plan for the state to make efficient use of telecommunications technology. Seasoned legislators will tell you that a legislative body spends about 20 percent of its efforts considering and adopting new legislation, and 80 percent of its efforts trying to fix unforeseen problems that have arisen from legislation it enacted earlier. Both of these state-level task forces were dealing with the 80 percent rather than the 20 percent. Their task was to recommend ways to fix problems that resulted from previous decisions.

The task force charged with fixing problems resulting from the deregulation of natural gas provided a lesson in how legislation that is badly crafted can undermine what is essentially a workable idea. In the mid-1990s, deregulation was a hot concept. The conventional wisdom was that it would generate more competition, producing lower prices and happier consumers. So Congress and state legislatures rushed to deregulate industries from airlines to telecommunications to utilities. And in many cases the results were problematic, not because deregulation in itself was such a bad idea, but because the legislators lacked that systems perspective that engineers have. They did not have the expertise necessary to develop a workable

approach and did not take time to seek out unbiased advice. The result was legislation that was either poorly written and did not anticipate consequences, or legislation that was written by industry lobbyists who had stepped into the breach caused by the lack of expertise. Allowing industry lobbyists to write legislation is like letting the fox into the hen house. It usually becomes an exercise in maximizing profits for the industry at the expense of other considerations.

Legislation with technological implications and ramifications needs to be carefully developed, and it needs the input of unbiased experts who can anticipate how its implementation will play out and can help to structure it so that it works well and does what needs to be done. Scientists and engineers can make an important contribution by offering the technological expertise that is essential to crafting wise policy.

The national level is the most difficult level to get something done, or to feel like you're making a difference. Here, the shaping of legislation and policy is distant and displaced from its implementation and from the people who are directly affected by it. The problems and issues also tend to be large, complex and long-range in scope. In contrast, the legislative attention span is very short. Every two years, the entire House of Representatives and one-third of the Senate is up for re-election. Not only are the political sands continually shifting, but legislators are perennially focused on what will get them re-elected within the next two years. It is very difficult to get them to focus on the longer timeframe that most of the issues confronting them really need and deserve.

As a result, their grasp of the issues tends to be somewhat like the six blind men who encountered an elephant in Rudyard Kipling's poem. One runs his hands over the elephant's side and decides the elephant is like a wall. Another finds the trunk and concludes the elephant is like a snake. The third encounters a tusk and compares the elephant to a spear. The fourth feels a leg and thinks of the elephant as tree-like. The fifth encounters an ear and decides the elephant is like a fan. And the final blind man grabs the tail and concludes the elephant is like a rope.

These men are focused on the piece of the elephant that happens to be in front of them at the moment. And because they are unable to see the larger picture, the conclusions they draw about the matter as a whole tend to be off-base. That's pretty much what it is like in Congress. A lot of large, long-term issues are floating slowly through the pipeline, but the members of Congress tend to see only the short-range portion that is right in front of them at the moment rather the big, long-term picture.

The lesson here is that if you want to make a difference, you have to pay attention to timing and you have to be persistent. You can't just write a report and assume that your mission has been accomplished. If you want to bring about a change, you have to bird-dog your issue and keep it alive for several years across the election cycles. If attention to it dries up after six months, your opportunity to achieve anything will have been lost. And you have to time your efforts so that you are talking about the various parts of your issue at the point when Congress is receptive to learning about that particular piece.

You also have to find the best place from which to speak. As you move up to each higher, larger level of public policy, the number voices clamoring to be heard increases. By the time you get to

the federal level in Washington, individual organizations are often lost in the throng. So it is important to find the right megaphone to amplify your message to a level that enables it to command attention and be heard. This means finding a credible, respected association of other like-minded organizations from across the country and becoming part of that larger, unified voice. For a technological university like Georgia Tech, that means we are actively involved in organizations like AAAS – the American Association for the Advancement of Science, which is a respect voice on science and technology policy.

Another place where technological universities are making our voices heard is the U.S. Council on Competitiveness, which I serve as a member of the executive committee together with several other research university presidents. This organization brings together leaders from the nation's most respected research universities, corporations, and labor organizations to promote a common national agenda for high-tech economic development. This broad base enables the Council to rise above both partisan bickering and special interest lobbying, giving it strong credibility.

Over the course of this year, I am co-chairing the Council's National Innovation Initiative, together with the CEO of IBM, Sam Palmisano. We launched the National Innovation Initiative in late February from right here at Georgia Tech, and several faculty from science, engineering, and public policy are involved. This initiative is very timely, because Congress is struggling with the issue of what to do to get the nation's economy back on sound footing, and is receptive to expertise and recommendations. Our work will take place behind the scenes while the nation is preoccupied with the presidential campaign, then next December – just after the election and just as the newly elected President and members of Congress are preparing their agenda – we will hold a national summit in Washington to make recommendations.

I also serve on PCAST – the President's Council of Advisors on Science and Technology – which is another high-profile voice that speaks credibility and power. However, it is part of the White House Office of Science and Technology Policy, so it does not speak with its own, independent voice. Its findings and recommendations go to the President, and whether anything happens as a result depends upon his priorities and what actions he is willing to pursue.

These examples are just some of the ways in which scientists and engineers can get involved in helping to shape public policy toward positive ends and making a difference in the broader world. But doing that calls for us to come out of our labs and engage in broader discussions. And it calls for us to view ourselves as global citizens and to see the technology we create as a tool to solve intricate social problems.